2013 County Engineers Research Focus Group

February 28, 2013

INTRODUCTION

The Iowa Department of Transportation (DOT) and Local Technical Assistance Program (LTAP) held the 3rd annual County Engineers Research Focus Group (CERFG) meeting in Ames, Iowa on February 28, 2013. The attendance at the meeting was approximately 40 to 50 people. Presentations during the meeting, among other things, summarized the importance of research to counties, relevant ongoing and upcoming research, low cost solutions and ideas, DOT library services, roadway safety, and a potential alternative to bituminous surface treatments. A roundtable discussion was also held that focused on a number of day-to-day challenges currently encountered by county engineers, along with the actions they have taken in response. Of course, the meeting also included the identification and prioritization of new research and outreach ideas for the Iowa Highway Research Board (IHRB).

MEETING OVERVIEW

The 2013 CERFG meeting was organized somewhat differently than the previous two years. The attendees were welcomed and they all introduced themselves. This year there were also attendees from the research sections of the Minnesota DOT and the Ohio DOT. The meeting continued with some opening remarks from the Crawford County Engineer and then some ongoing and upcoming research efforts were summarized. A discussion of low cost solutions/ideas followed and several national and regional LTAP "Mouse Trap" competition winners as well as Missouri Innovations Challenge winners were described. In addition, informational and technical presentations and discussions occurred about the following topics:

- Iowa DOT Library Services,
- Iowa DOT Safety Programs and Research,
- Low Cost Strategies to Address Speed and Crashes on Rural Curves, and
- Otta Seals.

During lunch a series of roundtable questions/topics were discussed and potential solutions or actions noted. After lunch, a number of research and outreach ideas were proposed by the attendees and five topics were selected for Iowa IHRB consideration. The meeting also included a short discussion on research result implementation.

The opening remarks, presentations and discussions during the 2013 CERFG meeting are briefly summarized in this document along with the results of the research/outreach prioritization effort.

OPENING REMARKS

Welcome and Introductions – Keith Knapp, InTrans

Opening remarks at the 2013 CERFG meeting were provided by Keith Knapp. Keith is with the Iowa LTAP and he explained the purpose of the CERFG meeting. He also indicated that it was developed to provide county engineers with a venue to suggest research and outreach ideas that might be considered for further funding to the IHRB. In addition, the meeting is an

opportunity for Iowa county engineers to have roundtable discussions about their day-to-day challenges and some of the actions needed to address them. Keith concluded the welcome by having all the attendees introduce themselves.

ICEA Perspective – Paul Assman, Crawford County

Paul Assman, Crawford County Engineer, was the first speaker at the 2013 CERFG meeting. Paul provided a county engineers perspective on the importance of the CERFG meeting. He indicated that things continue to change and that it is good for the county engineers to gather once a year to discuss how they can do things better and what research might be completed to assist in improved efficiencies and effectiveness. Paul mentioned the program his county has that has improved the clearing of roadway right-of-way brush through the use of local contractors and land owners. The county has also tested different materials on gravel roadways because the performance expectations of these roadways by the public continues to increase. Paul is also working on methods in his county that may result in better roadway grading and drainage. He concluded his presentation by indicating that there many opportunities and possibilities with the use and effectiveness of technologies. He expects that these technologies will help county equipment operators and result in improvements to the roadway assets of the counties.

RESEARCH PROJECT UPDATE

The second speaker on the agenda was Vanessa Goetz. Vanessa is the Secondary Road Research Engineer in the Iowa DOT Research and Analytics Bureau and she summarized recently completed, ongoing, and upcoming research projects in Iowa for the attendees. She indicated that 12 projects had been completed and that 9 or 10 of these might be of interest to the county engineers. She listed and briefly described the following completed projects:

- TR-568 – Modified Sheet Pile Abutments for Low Volume Bridges
- TR-584 – Development of LRFD Procedures for Bridge Piles in Iowa – Volume IV: Design Guide and Track Examples
- TR-604 – Field Testing and Evaluation of a Demonstration Timber Bridge
- TR-605 – Evaluation of the Buena Vista IBRD Bridge: A Furthering of Accelerated Bridge Construction in Iowa
- TR-608 – Financial Needs of Iowa's County Roads
- TR-609 – Examination of Curing Criteria for Cold-in-Place Recycling III
- TR-616 – Timber Abutment Piling and Back Wall Rehabilitation and Repair
- TR-618 – Parallel Wing Headwalls for Single RCBs (LRFD)
- TR-620 – Update of RCB Culvert Standards to LRFD Specifications (See http://www.iowadot.gov/bridge/v83elrfdculstd.html for the standards and http://www.iowadot.gov/bridge/finalprog.htm for the CulvertCalc software)
- TR-621 – Roadway Geosynthetic Reinforced Soil for Low Volume Bridge Abutments
- TR-624 – Development of Quality Standards for Inclusion of High Recycled Asphalt Pavement Content in Asphalt Mixtures
- TR-627 – Risk Mitigation Strategies for Operations and Maintenance Activities

The reports for the completed project listed previously can be found on the Iowa DOT website at http://www.iowadot.gov/research/reports.html. There are also two projects for which the reports are still being completed. These projects include TR-632 – Low Cost Rural Road Surface Alternatives and TR-638 – Western Iowa Missouri River Flooding: Geo-Infrastructure Damage Assessment, Repair and Mitigation Strategies. In addition, there are a number of projects that may be of interest to the counties that started in 2012 and are ongoing. These projects include the following:

- TR-642 – Pilot Project for a Hybrid Road-Flooding Forecasting System on Squaw Creek
- TR-644 – Development of Cost-Effective Timber Bridge Repair Techniques
- TR-645 – Development and Integration of Advanced Timber Bridge Inspection Techniques for NBIS
- TR-646 – Development of Bridge Inspection, Load Rating & Maintenance Manuals
- TR-647 – Methods for Removing Concrete Decks from Bridge Girders
- TR-648 – Evaluation and Testing of a Light-Weight Fine Aggregate Concrete Bridge Deck in Buchanan County, Iowa

Finally, some projects that may be of interest to local county agencies and will start in 2013 include:

- TR-653 – Durable Pavement Marking and Grooving
- TR-654 – Development of a Subgrade Drainage Model for Unpaved Roads
- TR-655 – Updating the Iowa Culvert Hydraulics and Iowa Bridge Backwater Software
- TR-656 – Biofuel Co-Product Uses for Pavement Geo-Materials Stabilization: Extensive Lab Characterization and Field Demonstration

Vanessa concluded her presentation by providing the attendees with an update on a project that will focus on the development of standards for precast slab bridges. This idea originated at a past CERFG meeting and the concept will be proposed later in 2013 to the IHRB. Vanessa asked the county engineers in attendance to contact her soon if they had any comments or input on the concept document. There were 17 county engineers on the technical advisory committee that have already reviewed the document.

LOW COST SOLUTIONS AND IDEAS

Vanessa Goetz also briefly summarized some low cost solutions and ideas. First, she provided all the attendees with a document that included the 2009 to 2012 National LTAP "Build a Better Mouse Trap" competition entry booklets. Each entry in the booklets typically included the city or county where it was "invented", the problem it addressed, a discussion of the solution, and the labor, equipment, and cost of the idea. The document she provided also included some of the same information for entries and/or winners of a similar LTAP Region 7 "You show Us" competition and the district winners from the 2012 Missouri DOT Innovation Challenge. Vanessa's discussion focused on just a few of the many innovations described in the document she distributed. The innovations discussed included a magnet system for collecting road debris, one man culvert loader, cone and barricade trailer, spring loaded object markers, large tire trailer transport, and a culvert inlet improvement. The document that was provided to the attendees will

be posted on the CERFG meeting website (see www.iowadot.gov/research/countyfocusgroup.html).

The discussion on low cost solutions and ideas was concluded by Wade Weiss, the Greene County Engineer, talking about some of the shop fabrication his staff does to save funds and improve efficiency. He recommended that counties take advantage of the skills they have on their own teams. His staff have built trailers for transporting calcium chloride and done repairs to existing trucks. He invited the CERFG attendees to visit his fabrication shop if anyone was interested. Keith Knapp also added that "mouse trap" ideas are often created out of necessity by staff but they don't realize that they are innovative. Each year the Iowa Streets and Roads Maintenance Supervisors Association works to identify and talk about several innovations in Iowa at their annual meeting.

IOWA DOT LIBRARY SERVICES

The next presentation at the 2013 CERFG meeting was given by Leighton Christiansen. Leighton is the Iowa DOT librarian and he talked about the services the Iowa DOT library can provide to county engineers in Iowa. The Iowa DOT library provides professional research and reference assistance, custom literature searches, interlibrary loans, and historical or archival research services. Leighton will pursue documents and send them directly to those requesting the information. He will summarize the process he follows and document its results. Links to the documents or the documents themselves are also provided. Leighton will also assist with or provide guidance to individuals doing personal searches of transportation reference databases. In general, he noted that a review of published information can show whether a question has been answered, provide better perspective on a subject, and also assist in the better definition of new research. The goal at the Iowa DOT is to digitize all the reports they have in the library by 2014 and then distribute a mechanism to access them. Many periodicals are also available digitally and the DOT Library can assist researchers that would like to access these subscriptions.

SAFETY PROGRAMS AND RESEARCH

Iowa DOT Safety Programs – Terry Ostendorf and Nicole Fox, Iowa DOT

The day of the 2013 CERFG meeting an additional subject item was added to the agenda. Terry Ostendorf and Nicole Fox from the Iowa DOT proposed that a discussion focused on Iowa DOT safety programs may be of interest. First, they noted that in the current federal highway funding legislation the High Risk Rural Roads program was no longer available. However, the Iowa DOT has decided to continue a version of that program with approximately 2 million dollars. It is proposed that this program (i.e., the Highway Safety Improvement Program (HSIP) – Secondary) will focus on longer, possibly multiple county, projects that install low cost safety improvements (e.g., rumble strips). Counties were invited to propose projects through a letter of interest and it was noted that the DOT and Institute for Transportation (InTrans) staff were evaluating data to help identify potential safety improvement locations. It was also noted that the counties involved with projects funded through this program should incur almost no costs. The DOT plans to provide all the funding and it will include the cost of a design firm and inspector (as needed). For multi-county projects, however, one county will need to be the lead agency.

Other Iowa DOT safety programs were also mentioned during this discussion. The Traffic Safety Improvement Program (TSIP) accepts applications through August 15th of each year and the DOT and LTAP staff can help with those. In addition, there are the "all town sign replacement", "horizontal curve sign", and "overhead flashing beacon replacement" programs. Information about all these programs can be found at the Iowa DOT Office of Traffic and Safety website (http://www.iowadot.gov/traffic/index.htm). In addition, a new program that focuses on high friction surface installation may also soon be offered. It is currently under development.

Safety Research Topics – Jeremey Vortherms and Terry Ostendorf, Iowa DOT

The next activity on the 2013 CERFG meeting agenda included a discussion of general roadway safety in Iowa and potential safety research topics that might be of interest to the counties. A large number of roadway safety and safety-related topics were discussed and some of them included:

- Installation of signs and/or guard rail that may not be warranted
- Easy access to known/finished studies with a "one-stop" center
- Sign effectiveness and legal or liability concerns connected to signs
- Engineers study processes
- Traffic engineering assistance
- Safety audits/assessments
- Surrogate safety measures for decision-making
- Safe routes to school
- Bridge closures and potential safety impacts
- Shoulder use and width
- Intersection traffic control effectiveness
- Iowa Strategic Highway Safety Plan
- Lane departure issues along with rumble strips and safety edge

The lane departure issues topic listed above and local safety plans were discussed in more detail. In particular, the county engineers were asked about the type of barriers they encounter with respect to rumble strips. The barriers noted by the county engineers included: lack of width on the pavement, noise, and policy issues. The discussion about local safety plans started with a focus on the idea that they could be completed as part of the Regional Planning Affiliate (RPAs) efforts here in Iowa. It was proposed that this approach might increase access to more funding for safety projects. In addition, a regional safety plan could address safety issues that are relevant to individual counties and also those that are appropriate for multi-county applications. The discussion that followed was primarily focused on the diversity of the counties and their needs. Jeremey and Terry concluded the discussion by asking that the counties continue to provide them with their feedback as the safety projects and programs at the Iowa DOT evolve.

A series of potential safety research ideas were also identified during this part of the 2013 CERFG meeting. These ideas are listed below and the first three in the list are those the county engineers thought should be addressed first. These three ideas are also included in the general research subject prioritization effort completed by the county engineers later in the day (the

results of which are described later in this document). The safety-related research ideas identified by the attendees were:

1. Use of rumble strips and maintenance durability (subject proposed for further prioritization)
2. Safety audit/assessment pamphlet and tools for supervisors (subject proposed for further prioritization)
3. Removal of traffic control devices/pavement markings and appurtenances (subject proposed for further prioritization)
4. How do we resist installation of unwarranted signs and/or add guardrail?
5. Better access to known and finished safety studies
6. The need for a one-stop resource center for safety information
7. Rumble strip(es) on county roads
    a. How to address public feedback – the noise reaction
    b. Encroachment from centerline and edgeline rumble strip installation
    c. Narrow pavement and space to put rumble strips
    d. Rumbles at spot and systemic approach
    e. Rumble strip(es) and shoulder width, pavement condition, winter maintenance, etc.
8. Examples of innovative safety improvement ideas
9. CMF clearinghouse for Iowa
10. Older drivers issues, educating operators and ways to share information
11. Younger driver education – visual examples
12. Safety features on old federal aid roads
13. Removal of traffic control devices and appurtenances
14. Long term asset tracking and management
15. Quantification of near misses
16. Reactive vs. proactive safety measures
17. Emergency response and access to funds (noted with respect to bridge closings)

COUNTY ENGINEER "ROUNDTABLE" DISCUSSIONS

Both before and during lunch a series of roundtable discussions were conducted on several subjects. These discussions had a free-form style. First, a potential problem or issue was introduced and if time allowed and there was an interest it was discussed. Useful information about the subjects was offered by the attendees with additional insight. The following list includes the subjects suggested by county engineers before the meeting for potential discussion:

- Do counties have policies that work well (policies were discussed that were connected to county interaction with utility companies, driveways, brush cutting, and adopt a roadway programs)?
- New county engineer training.

- Are counties using full depth reclamation?
- Performance quality measures for performance based incentives to employees
- Using apps: inventory control, timesheets, fuel, Purchase orders, service requests, equipment records, etc.
- Adding an automatic response email feature in Field Manager
- More uses for mowing tractors. Front mount 3pt mowers, snow blowers, chippers, shredders, reclaimers?
- Pooling resources to ship by rail/barge good quality aggregate

Not all of the subjects listed above were discussed because additional subjects of interest were also introduced during the roundtable time period. Some of the other subjects that were introduced during the meeting included the use of cold-in-place paving, reviewing employees based on outcome performance and the factors considered (e.g., smoothness of gravel roadways), the value of the Federal Highway Administration gravel road maintenance handbook, the use of recycled materials on gravel roads, and the use and cost of cell phones versus radios.

IDENTIFICATION/PRIORITIZATION OF RESEARCH AND OUTREACH TOPICS

After lunch the next activity on the 2013 CERFG meeting agenda was the identification and prioritization of research and outreach ideas for the IHRB. Recall that three safety-related were also carried forward from a previously described meeting activity to this general discussion of research ideas and prioritization. They are listed below along with the other research subjects identified. The number of votes received by each subject is also shown.

1. Methods of Cost Effective Upgrade of Gravel Roadway Aggregate (Specs) – 25 votes
2. Iowa Gravel Maintenance Manual – 20 votes
3. Removal of Traffic Control Devices and Appurtenances – 11 votes
4. Effective Methods of Tiling on Gravel Roads (Including Benefits and Cost) – 10 votes
5. Internal Curing and Joint Spacing (Monitoring work) – 9 votes
6. Use of Rumble Strips and Maintenance Durability – 8 votes
7. Otta Seals – 7 votes
8. Safety Audit/Assessment Pamphlet/Tools – 5 votes
9. Human Factors and Sign Effectiveness – 4 votes
10. Benefits/Costs to Full Closure (Roads/Bridges) – 4 votes
11. 511/Local Road Closure, Interoperability or Add-on Capability (interacting with Emergency Management) – 4 votes
12. Best Practices for Cross Section Choices/Pavement Design – 4 votes
13. Forensic Studies on Pavement/Gravel Conditions (Team Audit Approach Good/Bad) – 3 votes
14. Benefit/Cost of Mowing Roadside Ditches – 1 vote
15. Static Gap Assistance at Intersections – 0 votes
16. Automated Flagger – 0 votes
17. Remote Sensing of Winter Conditions on the Local System – 0 votes
18. Infrared Thermography (on Asphalt Paver) – 0 votes

After the prioritization was completed five of the meeting attendees volunteered to develop problem statements for the research subjects with the most votes. These problem statements were created for submission to the IHRB for funding consideration.

TECHNICAL PRESENTATIONS

The 2013 CERFG meeting concluded with the presentation of two technical subjects. One presentation focused on two research project that evaluated safety improvement strategies focused on speed and crashes at rural roadway horizontal curves. The other presentation was about Otta seals as a potential alternative to traditional bituminous surface treatments on gravel roadways. Both presentations are briefly summarized below.

Low Cost Strategies to Address Speed and Crashes on Rural Curves (Shauna Hallmark – Iowa State University and InTrans)

The first technical presentation given at the 2013 CERFG meeting focused on two research projects that evaluated the speed and/or crash impacts of countermeasures at rural roadway curves. One project was national and the other focused on study sites in Iowa. The presentation started with a general discussion of the percentage of crashes and run-off-the-road vehicle incidents generally occurring along curves. Then, a national research project was summarized that focused on the use of two types of dynamic curve signs at 22 location in 7 states. One of the signs displayed the speed of the approaching vehicle (if less than a specified maximum) if it was more than a defined speed threshold. The second sign was a dynamic curve warning sign that was activated above a particular threshold speed and included the words "SLOW DOWN" along with alternating top/bottom lights. The Iowa project, on the other hand, evaluated two low cost safety improvements at 6 high crash roadway curve study sites. One of the strategies or improvements was the application of reflectorized treatments to existing chevron sign posts at four study sites. The other strategy was on-pavement curve markings that included a curve arrow and the word "SLOW". This improvement was installed at two study sites. The presenter summarized the installation sites, data collection methodology and results for both projects. Overall, all the improvements evaluated appear to produce some decrease in the mean and 85th percentile vehicle speeds, but at particular study sites the results were sometimes mixed. All the improvements also appeared to reduce the percentage of vehicles traveling at speeds much greater than the posted or advisory speed. In addition, crash modification factors were calculated for the dynamic curve signs used in the national project. A summary report connected to the Iowa project and curve countermeasures (entitled "Toolbox of Countermeasures for Rural Two Lane Curves"), can be found at http://www.intrans.iastate.edu/research/projects/detail/?projectID=-1352703394.

Otta Seals: Alternative to Traditional Bituminous Surface Treatments (BSTs) for Gravel Roads (Halil Ceylan – Iowa State University and InTrans)

The second technical presentation at the 2013 CERFG meeting was about Otta seals. Otta seals are a form of surface treatment for gravel roadways and they were proposed as a potential alternative to traditional BSTs. Surface treatments are generally applied to provide a durable, impervious, and skid resistant surface that also prevents or reduces gravel loss, corrugations, and mud. Some types of surface treatments include asphalt concrete, chip seal, sand seal, slurry seal, and cape seal. In addition, some of the factors considered during the

choice of surface treatments include traffic volume, availability of materials, pavement type, aggregate type and quality, and considerations related to the environment, construction, maintenance, safety, and costs. The presentation on Otta seals included various comparison tables that included the Otta seal as a BST alternative. A process was also provided for the selection of different types of Otta seals. In general, the speaker indicated that Otta seals have evolved from a "maintenance seal" to an alternative to traditional BTSs without any special traffic limitations.

Otta seals originated in Norway in the 1960s and have been used in some form in several northern European and African countries, Chile, Australia, and New Zealand. They consist of graded aggregate in combination with a relatively low viscosity binder and may or may not have a sand seal cover. The strength of the Otta seal surface treatment is gained through bitumen binding (from rolling and traffic) and a mechanical aggregate interlock. It was proposed in the presentation that the service life of a single layer Otta seal was 8 to 12 years, but it was 12 to 16 years for a double layer Otta seal. In the United States Otta seals have been tried in Minnesota and South Dakota. A summary of the Otta seal performance in Minnesota after 7 years was provided during the presentation, and the 9 Otta seals in that state were considered to be in fair to good condition. The general conclusion of the presentation was that the constructability of Otta seals was more flexible and more labor friendly than traditional BSTs. A number of pictures were shown that showed the steps followed during the installation of an Otta seal.

RESEARCH IMPLEMENTATION DISCUSSION

A brief discussion on the implementation of research results was also completed as part of the CERFG meeting agenda. This discussion occurred between the two technical presentations summarized above. Keith Knapp, from Iowa LTAP and InTrans, began the discussion by distributing and summarizing a draft description for a potential Iowa Research Implementation Working Group. This document included a description of why the group was needed, a mission, a scope, and potential tasks/activities. It was also noted that sometimes research results cause agencies or professionals to stop doing something (i.e., the implementation of the research results can be a reduction in activity). In addition, the results from many research project are not always useful to local agencies. Overall, however, it appeared that it was generally acknowledged that there was a need to develop proper outreach to get relevant research results to local agencies and to disseminate important results as soon as possible. It was also noted that local agencies often do "research" evaluations themselves but the results of these efforts are only distributed through "word of mouth". Some type of mechanism to share that information would be of value. It was concluded that better outreach of research results would be beneficial to everyone, but that the working group would also have to remain active and focus on effectiveness.

SUMMARY OF MEETING

The 3rd annual CEFRG meeting included presentations about ongoing and future research projects, discussions about low-cost innovations and cost-cutting ideas, and technical presentations about speed and safety at horizontal curves and a potential alternative to BSTs. Roundtable discussions about some of the challenges faced by county engineers were also held. Of course, the 2013 CERFG meeting also included a discussion and prioritization of potential research project ideas in roadway safety and other areas of interest to county engineers. The

feedback at the 2013 CEFRG meeting was relatively positive, but improvements will be made for 2014.